REMARKS

1. Request for Continued Examination

5   The applicant respectfully requests continued examination of the above-indicated application as per 37 CFR 1.114.

2. Amendments to the Claims

10   Claims 21 and 22 are newly entered and include limitations fully supported by Figs. 1 and 6 and pertinent description in the specification. No new matter is introduced.

15   **3. Claim Rejections – 35 USC 103**

Claims 1, 3, 8-10, 15, 19, and 20 are rejected under 35 USC 103a as being obvious over Fukumoto et al. (US 6493296) in view of Kojima et al. (US 2002/0001282)

20   Response:

Claims 1 and 8

In the advisory action dated 06/01/2007, Examiner states that the rejections are maintained because Kojima teaches in Fig. 4 and paragraphs 39-42 reducing wave
25   front aberration by controlling tilt. However, the applicant still asserts that the claimed feature "when controlling the tilt servo to adjust the tilt angle between the optical disc and the object lens according to the DPD signal, the tilt search block finding an optimal tilt angle having a lowest amplitude DPD signal" is neither taught nor suggested by Fukumoto in view of Kojima. The rationale is given as below.
30   In paragraphs [0040] and [0041], Kojima discloses that Fig. 4 is a view illustrating a distribution of wave front aberration **after** the tilt correction is performed by the liquid crystal element, where the abscissa indicates a radial distance from the

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center of the objective lens to the outer periphery of the objective lens, while the ordinate indicates the phase difference. *(emphasis added)* In other words, Kojima Fig. 4 depicts a distribution of wave front aberration with respect to different positions of **the same** objective lens. *(emphasis added)* Therefore, Kojima merely uses the wave

5   front aberration diagram to explain that the resultant tilt correction effect provided by the liquid crystal element is able to reduce the original wave front aberration, as stated in paragraph [0042] that a remarkably improved effect for the phase difference can be seen in the center part and the peripheral part of the objective lens. The applicant respectfully notes that the tilt correction result shown in Kojima Fig. 4 teaches nothing

10   directed to the tilt control procedure.

      In paragraphs [0039] and [0040], Kojima discloses "phase differences are caused in accordance with voltage applied to light beams transmitted through the zones, which reduce wave front aberration caused by a tilt of the optical disc so as to effect the tilt correction" and "the applied voltage is subjected to proportional control in

15   accordance with a tilt value of the optical disc." Therefore, Kojima teaches controlling voltage zones in the electrode pattern of the liquid crystal element to cause phase differences in the transmitted light beams passing through the voltage zones, thereby making the resultant wave front aberration have the tilt-corrected distribution with respect to positions on the objective lens as the liquid crystal element is placed above

20   the objective lens as clearly illustrated in Fig. 8 and Fig. 1a. Additionally, in Kojima's disclosure, there is no description directed to referring to the phase difference for tilt correction. Therefore, the applicant respectfully points out that Kojima merely teaches that a tilt caused in the optical system can be reversely corrected by carrying out proportional correction for the applied voltage in accordance with a tilt degree, but

25   fails to teach or suggest referring to the minimum phase difference to control the tilt correction.

      Furthermore, in accordance with Kojima's teaching, the tilt correction by the liquid crystal element does not involve changing the tile angle between the optical disc and the optical pickup head at all. As a result, a person of ordinary skill in this art

30   is unable to modify the tilt detection method of Fukumoto in view of Kojima's tilt correction for anticipating the claimed feature "when controlling the tilt servo to **adjust the tilt angle between the optical disc and the object lens** according to the

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DPD signal, the tilt search block **finding an optimal tilt angle having a lowest amplitude DPD signal**" as Kojima's tilt correction is defined to be controlled according to the applied voltage proportional to the tilt degree rather than the phase differences caused by the liquid crystal element, and Kojima's tilt correction includes

5   no adjustment to the tilt angle between the optical disc and the optical pickup head. (*emphasis added*)

      Even assuming that the tilt correction by the liquid crystal element of Kojima is applied to the optical system of Fukumoto to replace the tilt control motor (reference numeral 102 in Fukumoto Fig. 1) and the tilt angle detected by a difference between

10   the DPP signal and the DPD signal is used to determine the applied voltages set to voltage zones of the liquid crystal element, the applicant notes that the combined teaching of Fukumoto and Kojima still fails to teach or suggest the claimed feature "the tilt search block **finding an optimal tilt angle** having a **lowest** amplitude DPD signal" as the tilt detection taught by Fukumoto uses a direct subtraction result

15   between the DPP signal and the DPD signal to represent the tilt angle, which is clearly shown in Fukumoto Fig. 1 and pertinent description in the specification. (*emphasis added*)

      Additionally, the applicant points out that a person of ordinary skill in this art is not motivated to modify the tilt detection mechanism of Fukumoto by incorporating

20   the operation of finding an optimal tilt angle having a lowest amplitude DPD signal. In col. 7, lines 45-50, Fukumoto teaches driving a tilt motor to control the tilt angle according to a differential signal between the DPP signal and the DPD signal, which is clearly illustrated in Fukumoto Fig. 1 showing that the DPP signal is subtracted from the DPD signal and a resultant subtraction result is used to directly represent the

25   detected tilt angle for driving the following tilt control motor. As depicted in Fukumoto Fig. 6, the radial tile degrees and the difference values of DPP signal and DPD signal have one-to-one mapping relationship; that is, the difference of DPP signal shown on the ordinate axis and DPD signal increases when the radial tilt shown on the abscissa axis increases. Therefore, as each difference value between the DPP

30   signal and the DPD signal **directly** presents a radial tile angle found by Fukumoto's tilt detection scheme, finding a minimum difference value of the DPP signal and the DPD signal is meaningless to the tile angle detection of Fukumoto.

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In light of at least above-mentioned reasons, the applicant respectfully asserts that claims 1 and 8 should not be found rejected under 35 USC 103(a) as being obvious over Fukumoto in view of Kojima because Kojima and Fukumoto do not teach, either alone or in combination, all of the limitations of claims 1 and 8.

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Claim 3

Claim 3 is dependent upon claim 1, and should be allowed if claim 1 is found allowable.

10 Claims 9, 10 and 15

Claims 9 & 10 and claim 15 are dependent upon claims 8 and 1 respectively, and should be allowed if claims 8 and 1 are found allowable.

Claims 19 and 20

15 Claims 19 and 20 claim limitations of adjusting the tilt angle between the optical disc and the object lens according to only the DPD signal. (*emphasis added*) As neither Fukumoto nor Kojima teaches this claimed feature, the applicant believes claims 19 and 20 have been placed in condition for allowance.

20 **Claim 2 is rejected under 35 USC 103a as being unpatentable over Fukumoto et al. and Kojima et al. in view of Scheffler (US 5021893)**

Response:

Claim 2 is dependent upon claim 1, which is believed allowable by the applicant
25 for at least the above stated reasons; therefore, claim 2 should also be found allowable.

Claims 5-7 and 12-14 are rejected under 35 USC103a as being unpatentable over Fukumoto et al. and Kojima et al. in view of Gleim (US 4888754)

30 Response:

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Claims 5, 7 and 12

Referring to above arguments under Claims 1 and 8, as each difference value
between the DPP signal and the DPD signal directly corresponds to a radial tile angle
according to Fukumoto's disclosure, finding a minimum difference value of the DPP

5   signal and the DPD signal is meaningless to the tile angle detection of Fukumoto.
Therefore, the applicant asserts that a person of ordinary skill in the art is not
motivated to add the coarse and fine adjustment of Gleim to the apparatus of
Fukumoto for finding the optimum tilt angle having the minimum amplitude DPD
signal. Additionally, claims 5 & 7 and claim 12 are dependent upon claims 1 and 8

10   respectively, and should be allowed if claims 1 and 8 are found allowable.

Claims 6, 13, and 14

Claim 6 and claims 13 & 14 are dependent upon claims 1 and 8 respectively,
which are believed allowable by the applicant for at least the above stated reasons;

15   therefore, claims 6, 13, and 14 should also be found allowable.

4. Patentability of New Claims 21 and 22

The newly added claims 21 and 22 include limitations of controlling the tilt servo

20   to adjust the tilt angle between the optical disc and the object lens to a plurality of
angles and then finding a specific tilt angle from the plurality of angles according to
the DPD signal. (*emphasis added*) As stated in above arguments under Claims 1 and
8, finding a specific tilt angle from a plurality of tilt angle is meaningless to the tilt
angle detection of Fukumoto. The applicant therefore believes that a person of

25   ordinary skill in the art is not motivated to add the coarse and fine adjustment of
Gleim to the apparatus of Fukumoto for finding one tilt angle from a plurality of
angles according to the DPD signal. Additionally, regarding Kōjima's disclosure, it
merely teaches setting the voltages applied to voltage zones of the liquid crystal
element according to the tilt value, and includes no description pertinent to finding

30   one tilt angle from a plurality of angles. In light of at least the stated reasons, the
applicant respectfully asserts that the limitations of claims 21 and 22 are not taught or
suggested by any of the cited references or combinations thereof.

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5. Conclusion

5   Thus, all pending claims have been placed in condition for allowance with respect to the cited art for at least the reasons presented above. The applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

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